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⑤ For the evaluation of the patent in consideration,
reference was made to the following documents:

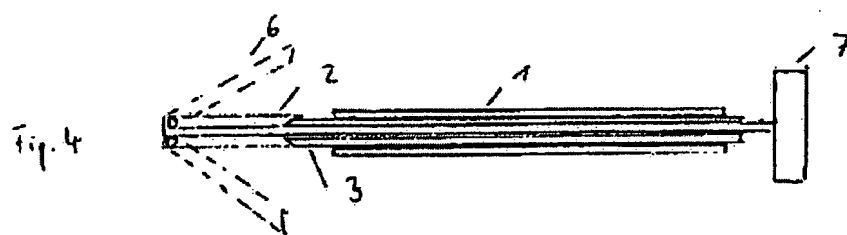
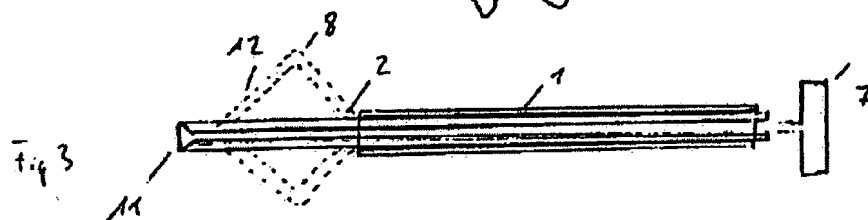
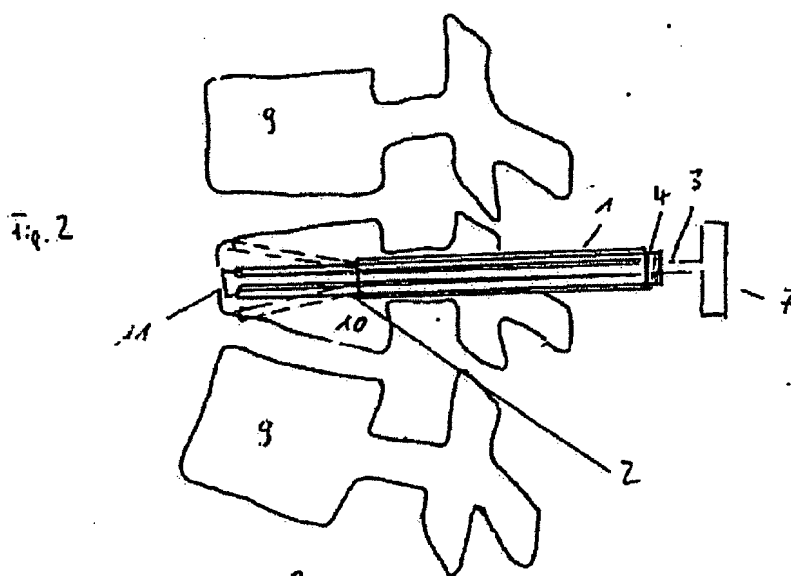
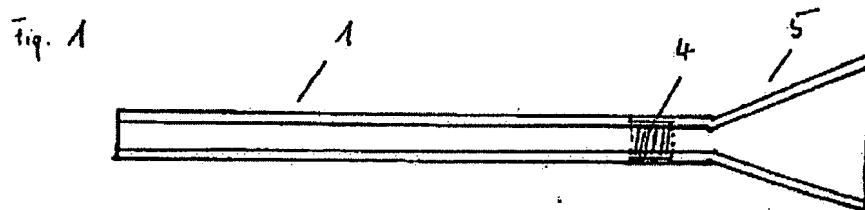
DE 34 14 374 A1

DE 32 19 575 A1

⑤④ Instrument for handling of broken vertebrae

A device (vertebrae prop) for the surgical
repositioning of broken dorsal vertebral bodies is
proposed, which involves the erection through a single
manipulation of the broken vertebra without involving
an intact vertebral body.

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1 Description

The invention concerns a device for treating broken vertebral bodies.

Previous devices for the treatment of broken vertebral bodies also concern the neighboring vertebral bodies. The procedure applied in the currently used instruments that affect intact neighboring vertebral bodies is however unfavorable, since a collateral damage is to be feared.

The purpose of the present invention is to create a simple device which makes it possible to reposition broken dorsal vertebral bodies, without thereby affecting the intact neighboring vertebral bodies.

This task is solved by a device like the one described in Claim 1. Some beneficial applications of the invention are described on Claims 2 to 19.

A threaded rod can be used for separating the internal end of the separating tube. The thread can also be omitted, if through another instruments, such as the outside end, locking can be ensured. However it is also possible to separate with other different means, like pressure moving bars, conical heads pulled by a rope, etc., which also cause an expansion of the separating tube.

By using a device designed according to the invention, it is possible to make an operational repositioning of broken dorsal vertebral bodies.

After a transcutaneous or surgical opening of the vertebral arch of the damaged dorsal vertebra, the arch roots of the vertebral under X-ray control are drilled out. Then the device shaped as a work tube on both sides is placed into the vertebral body by the operating channel, and then the device designed according to the invention is displaced sufficiently far into the vertebral body. The arms of the separator can be then opened forwards, depending on the shape of the rupture, to the center or to the rear, in order to reposition the compressed rupture.

Under endoscopic or open control, an additional work tube can then be brought through the spine into the space of the intervertebral. The remaining damaged intervertebral disk tissue, which did not penetrate by the injury into the vertebral body, can be removed using fine biopsy pliers. The emptied intervertebral disk space can be finally filled up over the work tubes with cancellous bone powder. Using the device designed according to invention, the endoscopic operation of intervertebral disks can be likewise accomplished.

Further details and benefits from of the invention are described in further detail below, using an application example. It can be seen on:

Fig. 1 - A work tube designed according to the invention

Fig. 2 - A first variation of the instrument designed according to the invention, which can be introduced into a straightened up vertebral body

Fig. 3 - A second variation of the device designed according to invention and

Fig. 4 - A further variation of the device designed according to invention.

Fig. 2 shows a device designed according to invention in a straightened up vertebral body 10. The adjacent vertebral body 9 is not needed for the repositioning.

The "external" tube end is provided with a thread 4 on a cup head 5 or with an impact protection ring

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(Fig. 1) which can be screwed on. The work tube has a gauge of 4 to 12 mm, preferably 8 mm.

According to Fig. 2, the Type 1 vertebra separator has an approx. 20 cm long threaded rod 3, whose "internal" end has a conical head 11. The threaded rod 3 is pivoted in separating tube 2 which is equipped with an internal thread, whose outside diameter corresponds precisely to the inside diameter of work tube 1, so that it can be - pushed through by it. The "internal" end of separating tube 2 has a slit with a length of 2,5 cm, which allows it to be expanded. The "internal" end of threaded rod 3 carries an outwards extended conical head 11 (up to the internal diameter of the work tube). When the threaded rod 3 is pulled backwards, this fits itself into separating tube 2 and pushes apart repositioning blade 12 (Fig. 2).

The type 2 vertebra separator shown in Fig. 3 is basically built under the design principle of the Type 1 vertebra separator. Contrary to the type 1 design, the slitting on the "internal" end does not pull through, but it is halted approx. 2 mm before the end. When the threaded rod 3 is pulled back, a rhombic or bulgy expansion is caused, which leads to repositioning the cover and the base plate within the middle range (Fig. 3). Thereby a joint 8 can be arranged. The expansion can take place however also by the flexible outwards bending of the threaded rod 3.

Fig. 3 shows a Type 3 vertebra separator with a threaded rod 3 with internal threading. Threaded rod 3 fits precisely into the work tube 1. A separating tube 2 with external thread is led into threaded rod 3, whose internal end has an articulated connection with Separating blade 6. The rearwards opened separating blade 6 has a length of 0.5 to 4 cm, preferably 2.5 cm and does not rest on the threaded rod on its separated condition. When the threaded rod is turned, the dorsal separating blades are opened, thereby causing the dorsal erection of the cover and base plate as well as the trailing edge of the vertebral body (Fig. 4).

The invention is by no means limited to the illustrated example. It is possible to achieve numerous versatile applications in the context of the invention, as it is characterized in the patent claims below.

Patent claims

1. Device for handling broken vertebral bodies, characterized by the fact that it has a work tube 1, which holds inside a separating tube (2) and an instrument which causes the separation of the internal end of the separating tube.
2. Device designed according to Patent claim 1, characterized by the fact that the instrument has a threaded rod (3).
3. Device designed according to Patent Claim 2, characterized by the fact that the threaded rod (3) carries a conical head (11) at its internal end
4. Device designed according to one of the preceding Patent claims, characterized by the fact that the separating tube (2) has an internal thread.
5. Device designed according to claim 4, characterized by the fact that the internal thread of the separating tube (2) is crowned with the threaded rod.
6. Device designed according to one of the preceding Patent claims, characterized by the fact that the threaded rod (3) is lead into a separating tube.

7. Device designed according to one of the preceding patent claims, characterized by the fact that the work tube has a thread (4) at its end. 5
8. Device designed according to Patent claim 6, characterized by the fact that it is possible to screw a cup head (5) or an impact protection ring onto the thread. 10
9. Device designed according to one of the preceding patent claims, characterized by the fact that a provided canula with a sharp point can be inserted into the work tube (1). 15
10. Device designed according to one of the preceding patent claims, characterized by the fact that the separating tube (2) is slit at the internal end for the insertion of a repositioning blade (12) 20
11. Device designed according to patent claim 10, characterized by the fact that the length of the slit is of 0.5 to 5 cm, preferably 2.5 cm.
12. Device designed according to patent claims 10 or 11, characterized by the fact that the slitting begins at the internal end of the separating tube (2). 25
13. Device designed according to patent claims 10 or 11, characterized by the fact that slitting begins approx. 1-15 mm, (preferably 2 mm) from the internal end of the separating tube. 30
14. Device designed according to patent claims 1 or 2, characterized by the fact that the separating tube (2) has an external thread. 35
15. Device designed according to patent claims 1 or 2, characterized by the fact that the threaded rod (3) is led into the work tube (1) and has an internal thread. 40
16. Device designed according to patent claims 14 or 15, characterized by the fact that the threads of the separating tube and the threaded rod comb are crowned with one another. 45
17. Device designed according to one of patent claims 1, 2, 14, 15 and 16, characterized by the fact that the separating tube (2) carries a connected separating blade (6) at its internal end over an articulating joint, which can be separated by the threaded rod. 50
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18. Device designed according to one of the preceding patent claims, characterized by the fact that the threaded rod (3) carries an operating device (7). 55
19. Device designed according to patent claim 13, characterized by the fact that the separating tube (2) is provided with a joint (8) within the slit area. 60

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